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NATIONAL DAM SAFETY PROGRAM. SHERMAN LAKE DAM (MO 30839), MISSI--ETC(U)
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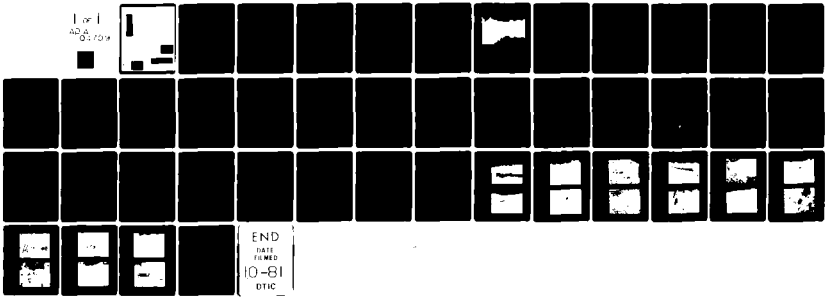

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report was prepared under the National Program of Inspection of Non-Federal Dams. This report assesses the general condition of the dam with respect to safety, based on available data and on visual inspection, to determine if the dam poses hazards to human life or property.

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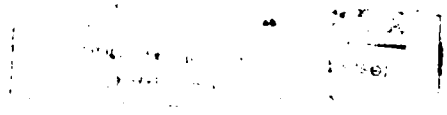
SHERMAN LAKE DAM
BOLLINGER COUNTY, MISSOURI
MISSOURI INVENTORY NO. 30839

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

PREPARED BY: ST. LOUIS DISTRICT CORPS OF ENGINEERS
FOR: GOVERNOR OF MISSOURI

AUGUST 1979



PHASE I REPORT

NATIONAL DAM SAFETY PROGRAM

Name of Dam	Sherman Lake Dam
State Located	Missouri
County Located	Bollinger County
Stream	Castor River
Date of Inspection	23 May 1979

A 23

The Sherman Lake Dam was inspected by an interdisciplinary team of engineers from the Memphis District, U. S. Army Corps of Engineers. The purpose of the inspection was to make an assessment of the general condition of the dam with respect to safety, based upon available data and visual inspection, in order to determine if the dam poses hazards to human life or property.

The guidelines used in the assessment were furnished by the Department of the Army, Office of the Chief of Engineers and developed with the help of several Federal and State agencies, professional engineering organizations, and private engineers. Based on these guidelines, this dam is classified as a small size dam with a high downstream hazard potential. Failure would threaten the life and property of approximately 5 families downstream of the dam and cause appreciable damage to Highway 51 bridge located approximately one mile downstream.

The inspection and evaluation indicate that the spillway does not meet the criteria set forth in the guidelines for a dam having the above mentioned size classification and hazard potential. For its size and hazard category, this dam is required by the guidelines to pass from one-half PMF to PMF. However, considering the high-hazard potential to life and property of approximately five families downstream of the dam, the PMF is considered the appropriate spillway design flood. The PMF is defined as the flood discharge that may be expected from the most severe combination of critical meteorological and hydrologic conditions that are reasonably possible in the region. The spillways for Sherman Lake will only pass 15 percent of the PMF before the dam embankment is overtopped. Because the spillways will not pass one-half of the PMF without overtopping but will pass the 10-year frequency flood, the dam is classified as "unsafe non-emergency". Also the spillways will not pass the 100-year flood without overtopping, which is a flood that has a 1 percent chance of being exceeded in any given year.

Other deficiencies visually observed by the inspection team were trees and bushes on the upstream embankment slope and at the right abutment emergency spillway; erosion gullies on the downstream embankment slope; and seepage. Another deficiency found was the lack of seepage and stability analysis records.

It is recommended that the owner take action to correct or control the deficiencies described. Corrective works should be in accordance with analyses and design performed by an engineer experienced in the design and construction of dams.

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SUBMITTED BY: SIGNED
Chief, Engineering Division — 19 SEP 1979 — Date

APPROVED BY: SIGNED
Colonel, CE, District Engineer — 19 SEP 1979 — Date

Overview of Lake and Dam

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
SHERMAN LAKE DAM - ID NO. 30839

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SECTION 1 - PROJECT INFORMATION

1.1 GENERAL

a. Authority. The National Dam Inspection Act, Public Law 92-367, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a program of safety inspection of dams throughout the United States. Pursuant to the above, the District Engineer for the St. Louis District, Corps of Engineers, directed that a safety inspection of the Sherman Lake Dam be made.

b. Purpose of Inspection. The purpose of the inspection was to make an assessment of the general condition of the dam with respect to safety, based upon available data and visual inspection, in order to determine if the dam poses hazards to human life or property.

c. Evaluation Criteria. Criteria used to evaluate the dam were furnished by the Department of the Army, Office of the Chief of Engineers, in "Recommended Guidelines for Safety Inspection of Dams." These guidelines were developed with the help of several Federal agencies and many State agencies, professional engineering organizations, and private engineers.

1.2 DESCRIPTION OF PROJECT

a. Description of Dam and Appurtenances.

(1) The dam is an earth embankment built in a narrow valley in the uplands which border the Mississippi Embayment. Topography adjacent to the valley is rolling to steep. Soils in the area are formed of red sandy clays with fragments of dolomite and chert. Topography in the vicinity of the dam is shown on Plate 2.

(2) The primary means of discharge is two emergency spillways cut in the right and left abutments.

(3) Pertinent physical data are given in paragraph 1.3 below.

b. Location. The dam is located in the southwestern portion of Bollinger County, Missouri, as shown on Plate 1. The lake formed by the dam as shown on Plate 2 is located on the Zalma, Missouri Quadrangle sheet in Section 31; Township 29 North; Range 9 East.

c. Size Classification. Criteria for determining the size classification of dams and impoundments are presented in the guidelines referenced in paragraph 1.1 c above. Based on these criteria, this dam is in the small size category.

d. Hazard Classification. Guidelines for determining hazard classification are presented in the same guidelines as referenced in paragraph c above. Based on referenced guidelines, this dam is in a High Hazard Classification.

e. Ownership. The dam is owned by Mr. Milton Nitsch, Route 3, Highway 61 East, Jackson, Missouri 63755.

f. Purpose of Dam. The dam forms a 12-acre recreational lake.

g. Design and Construction History. The dam was constructed around 1964 by the previous owner, Bill Sherman, of Sherman Brothers Excavation Company. There were no design plans. Borrow material for the construction of the dam consisted of the native red clay which was taken from the lake area and from the surrounding hills. The dam reportedly has a 16 foot wide core trench that extends approximately 14 feet down to rock.

h. Normal Operating Procedure. Normal rainfall, runoff, transpiration, and evaporation all combine to maintain a relative stable water surface elevation. The dam reportedly was overtopped in the early 1970's during a period of very heavy rainfall.

1.3 PERTINENT DATA

a. Drainage Area. 551 acres.

b. Discharge at Damsite. (1) Discharge can take place through two emergency spillways cut in the right and left abutments.

(2) Estimated experienced maximum flood at damsite - unknown.

c. Elevation. (Feet above M.S.L.)

(1) Observed Pool - 396.10

(2) Normal Pool - 395.9

(3) Spillway Crest - Left Abutment - 396.1
Right Abutment - 395.9

(4) Maximum Experienced Pool - unknown (Dam reportedly overtopped, early 1970's).

(5) Top of Dam - 399.2

(6) Maximum Pool (PMF) - 401.4

(7) Invert of discharge pipe at stilling basin - N/A

(8) Maximum tailwater - unknown

d. Reservoir. Length of maximum pool - 2000± feet

e. Storage (Acre-feet).

(1) Observed Pool - 147

(2) Normal Pool - 144

(3) Spillway Crest - Left Abutment - 147
Right Abutment - 144

(4) Maximum Experienced Pool - unknown

(5) Top of Dam - 207

(6) Maximum Pool (PMF) - 257

f. Reservoir Surface (Acres).

(1) Observed Pool - 18.81

(2) Normal Pool - 18.61

(3) Spillway Crest - Left Abutment - 18.81
Right Abutment - 18.61

(4) Maximum Experienced Pool - unknown

(5) Top of Dam - 21.91

(6) Maximum Pool (PMF) - 24.47

g. Dam.

(1) Type - earth embankment.

(2) Length - 440 feet.

(3) Height - 25 feet maximum.

(4) Top width - 15 feet.

(5) Side slopes -

(a) Downstream - 1V on 3.5H (Average).

(b) Upstream - 1V on 3.0H (Average).

(6) Zoning - unknown.

(7) Impervious core - core trench reportedly 14 feet deep and 16 feet wide.

(8) Cutoff - unknown.

(9) Grout curtain - unknown.

h. Diversion and Regulating Tunnel. None.

i. Primary Discharge System. None.

j. Emergency Spillway.

(1) Type - Uncontrolled earthen trapezoidal.

(2) Width of weir - Left Abutment - 25' (Average).
Right Abutment - 45' (Average).

(3) Length of weir - N/A.

(4) Crest elevation - Left Abutment - 396.1 feet m.s.l.
Right Abutment - 395.9 feet m.s.l.

k. Regulating Outlet. None.

SECTION 2 - ENGINEERING DATA

2.1 DESIGN

No design data exists.

2.2 CONSTRUCTION

The dam was constructed around 1964 by the previous owner, Bill Sherman, of Sherman Brothers Excavating Company. The dam was constructed from the native red clays taken from the lake area and the surrounding hills. The dam reportedly has a 16 foot wide core trench which extends approximately 14 feet down to rock.

2.3 OPERATION

There are no structures or appurtenances associated with the dam other than the two uncontrolled spillways located at the right and left abutments.

2.4 EVALUATION

a. Availability. The only engineering data readily available are the personal recollections of the present and previous owners.

b. Adequacy. The field and visual inspections presented herein are considered adequate to support the conclusions of this report. Seepage and stability analyses comparable to the requirements of the "Recommended Guidelines for Safety Inspection of Dams" were not available which is considered a deficiency. These seepage and stability analyses should be performed for appropriate loading conditions (including earthquake loads) and made a matter of record.

c. Validity. Not applicable.

SECTION 3 - VISUAL INSPECTION

3.1 FINDINGS

a. General. Visual inspection of Sherman Lake Dam was performed on 23 May 1979. Personnel making the inspection were employees of the Memphis District, Corps of Engineers, and included a geologist, hydraulic engineer, and soils engineer. Specific observations are discussed below.

b. Project Geology. The dam is located on the foothills of the Salem Plateau which is part of the Ozark Plateau system. The dam is situated at the edge of the uplands where the creek flows out onto the alluvium of the Castor River. The slopes around the lake are gentle and the possibility of a sudden landslide into the lake is very remote. As the dam is reportedly to have been constructed from local materials it probably consists of red sandy clay with dolomite and chert fragments intermixed. A cherty dolomite is exposed in the bottom of both spillways. The dolomite is badly weathered and fractured where it is exposed. The soil consists of rock fragments and a sandy red clay which is the product of the weathering of the dolomitic bedrock. The cherty dolomite is part of the Lower Ordivician and is probably the Jefferson City or Cotter formation. The Dolomite is light gray to tan containing chert nodules. The chert is highly resistant and forms a large part of the fragments found in the residuum. The Jefferson City formation is underlain by the Roubidoux formation which is composed of sandstone, chert and dolomite. The dam is located in a Seismic Zone 2.

c. Dam. Based on the cross-section presented on Plate 5 the dam has an average upstream embankment slope of 1V on 3H and an average downstream slope of 1V on 3.5 H. The crown width of the dam is 15 feet. The visual inspection indicates no evidence of any undue settlement, cracking or sliding of the dam. No animal burrows were observed in the dam.

Trees and bushes are growing along the entire length of the upstream face of the dam (see Photo 4). The upstream embankment has no erosion protection and some wavewash and erosion has occurred intermittently along the upstream face (see Photo 5). Several erosion gullies were noted on the downstream side of the crown and on the downstream slopes at baseline stations 4+08 and 4+30 (see Photos 6 and 8). At station 5+35 there is a large wash area near the valley slope at the right abutment (see Photo 9).

A large wet area was observed at the downstream toe of the dam from baseline 3+00$\pm$ to station 4+50$\pm$ (see Plate 6). The area was soft and spongy and was covered with trees, cattails, and other vegetation (see Photos 10 and 11). Crawfish holes were also observed in the area. Portions of the area appeared to be just trapped water, but evidence of seepage was apparent at several locations (see Photos 12 and 13). The majority of the seepage seemed to be concentrated in an area from stations 4+00 to 4+50. Seepage flows were estimated to be 50 gpm. No material was observed being piped by the seepage flows.

d. Appurtenant Structures. Two uncontrolled spillways, one located at each abutment, provide the only means of discharge from the lake (see Photos 14 - 17). The earth spillways consist of a sandy red clay with rock fragments. A cherty dolomite is exposed in the bottom of both spillways.

Trees and vegetation were observed at the inflow area of the spillway at the right abutment (see Photo 14) creating an obstruction to flow. The spillway at the left abutment is free from obstruction.

e. Reservoir Area. No wave wash, excessive erosion, or slides were observed along the shore of the reservoir.

f. Downstream Channel. The downstream channels for both spillways are in relatively good condition and are not overgrown with vegetation (see Photos 15 and 17).

3.2 EVALUATION

None of the conditions observed are significant enough to indicate a need for immediate remedial action or a serious potential of failure. Visually observed seepage, trees on the upstream embankment and at the inflow of the right abutment spillway, and erosion gullies and wash areas on the downstream slope are deficiencies which, left uncontrolled or uncorrected, could lead to the development of potential problems.

SECTION 4 - OPERATIONAL PROCEDURES

4.1 PROCEDURES

The two emergency spillways are uncontrolled; therefore, no regulating procedures exist for these structures.

4.2 MAINTENANCE OF DAM

Little maintenance is apparent as evidenced by the wave wash areas on the upstream slopes and erosion gullies on the downstream slope. Brush and small trees are growing on the upstream face of the dam and at the inflow area of the right abutment spillway.

4.3 MAINTENANCE OF OPERATING FACILITIES

No operating facilities exist. The two uncontrolled spillways provide the only means of discharge from the lake.

4.4 DESCRIPTION OF ANY WARNING SYSTEM IN EFFECT

The inspection team is not aware of any existing warning system for this dam.

4.5 EVALUATION

If the trees and brush on the upstream slope and at the right abutment spillway, the wavewash on the upstream embankment, and the erosion gullies on the downstream slope are allowed to continue, potential problems could develop.

SECTION 5 - HYDRAULIC/ HYDROLOGIC

5.1 EVALUATION OF FEATURES

a. Design Data. No design data are available for evaluation.

b. Experience Data. The drainage area and lake surface area are developed from USGS Zalma, Missouri Quadrangle. The spillway and dam layout are from surveys made during the inspection.

c. Visual Observations.

(1) The principal means of discharge is from two uncontrolled earthen spillways located at the right and left abutments.

(2) Trees are growing in the inflow area of the right abutment spillway.

d. Overtopping Potential. The spillway will pass 15 percent of the Probable Maximum Flood (PMF) at a discharge of 620 cfs without overtopping. The Probable Maximum Flood is defined as the flood discharge that may be discharged from the most severe combination of critical meteorologic and hydrologic conditions that are reasonably possible in the region. The PMF will overtop the embankment for a period of 6 hours at a depth of 2.2 feet with a discharge of 5400 cfs. The one-half PMF will overtop the embankment for a period of 4 hours at a depth of 1.2 feet with a discharge of 2600 cfs. The 100-year frequency will also overtop the embankment. For its size and hazard category, this dam is required by the guideline to pass from one-half PMF to PMF. However, considering the high hazard potential to life and property of approximately 5 families downstream of the dam, the PMF is considered to be the appropriate spillway design flood. Because the spillways will not pass one-half of the PMF without overtopping but will pass the 10-year frequency flood, the dam is classified as "unsafe non-emergency." The data utilized in the preparation of these estimates was various Federal reports, data from field inspection and survey, and output from COE program, HEC-1, Dam Safety Version.

SECTION 6 - STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observations. Visual observations of the dam and appurtenant structures are discussed and evaluated in SECTIONS 3 and 5.

b. Design and Construction Data. The design and construction data were limited to that information discussed in SECTION 2.

c. Operation Records. There have been no known operations which have affected the structural stability of the dam.

d. Post Construction Changes. No post construction changes exist which will affect the structural stability of the dam.

e. Seismic Stability. This dam is located in Seismic Zone 2. However, it is located very near the boundary between Seismic Zones 2 and 3. Since this dam is located in Seismic Zone 2 and the proximity of Seismic Zone 3, it is possible that an earthquake could occur of sufficient intensity to cause severe damage or failure of the dam.

SECTION 7 - ASSESSMENT/REMEDIAL MEASURES

7.1 DAM ASSESSMENT

a. Safety. Several items were noted during the visual inspection which should be corrected or controlled. These items are trees and brush on the upstream embankment face and right abutment spillway inlet area; wavewash and erosion on the upstream embankment; erosion gullies and wash areas on the downstream embankment slopes; and observed seepage. Seepage and stability analyses comparable to the requirements of the "Recommended Guidelines for Safety Inspection of Dams" were not available which is considered a deficiency. These seepage and stability analyses should be performed for appropriate loading conditions (including earthquake loads) and made a matter of record. Also these analyses should be utilized to detail the corrective actions called for in paragraph 7.2. The Probable Maximum Flood (the spillway design flood) and one-half of the Probable Maximum Flood will both overtop the dam. Because the spillways will not pass one-half of the PMF without overtopping but will pass the 10-year frequency flood, the dam is classified as "unsafe non-emergency".

b. Adequacy of Information. Due to the lack of engineering design and construction data, the conclusions in this report were based on performance history and external visual conditions. The inspection team considers that these data are sufficient to support the conclusions herein.

c. Urgency. The remedial measures recommended in paragraph 7.2 should be accomplished in the near future. The item recommended in paragraph 7.2 a should be pursued on a high-priority basis. The stability and seepage analyses should be given priority by the owner and accomplished without delay in order to determine if corrective measures are necessary. If the safety deficiencies listed in paragraph 7.1 a. are not corrected in a timely manner, they could lead to the development of potential problems.

d. Necessity for Phase II. Based on the results of the Phase I inspection, no Phase II inspection is recommended.

e. Seismic Stability. This dam is located in Seismic Zone 2. However, it is located very near the boundary between Seismic Zones 2 and 3. Since this dam is located in Siesmic Zone 2 and the proximity of Seismic Zone 3, it is possible that an earthquake could occur of sufficient intensity to cause severe damage or failure of the dam.

7.2 REMEDIAL MEASURES

a. Alternatives. Spillway size and/or height of dam should be increased to pass the Probable Maximum Flood without overtopping the dam.

b. Perform seepage and stability analyses to assess the safety concerns raised by the seepage persent at the downstream toe of the dam. Use the results of these analyses to design appropriate corrective measures.

c. O & M Maintenance and Procedures. The following O & M maintenance and procedures are recommended:

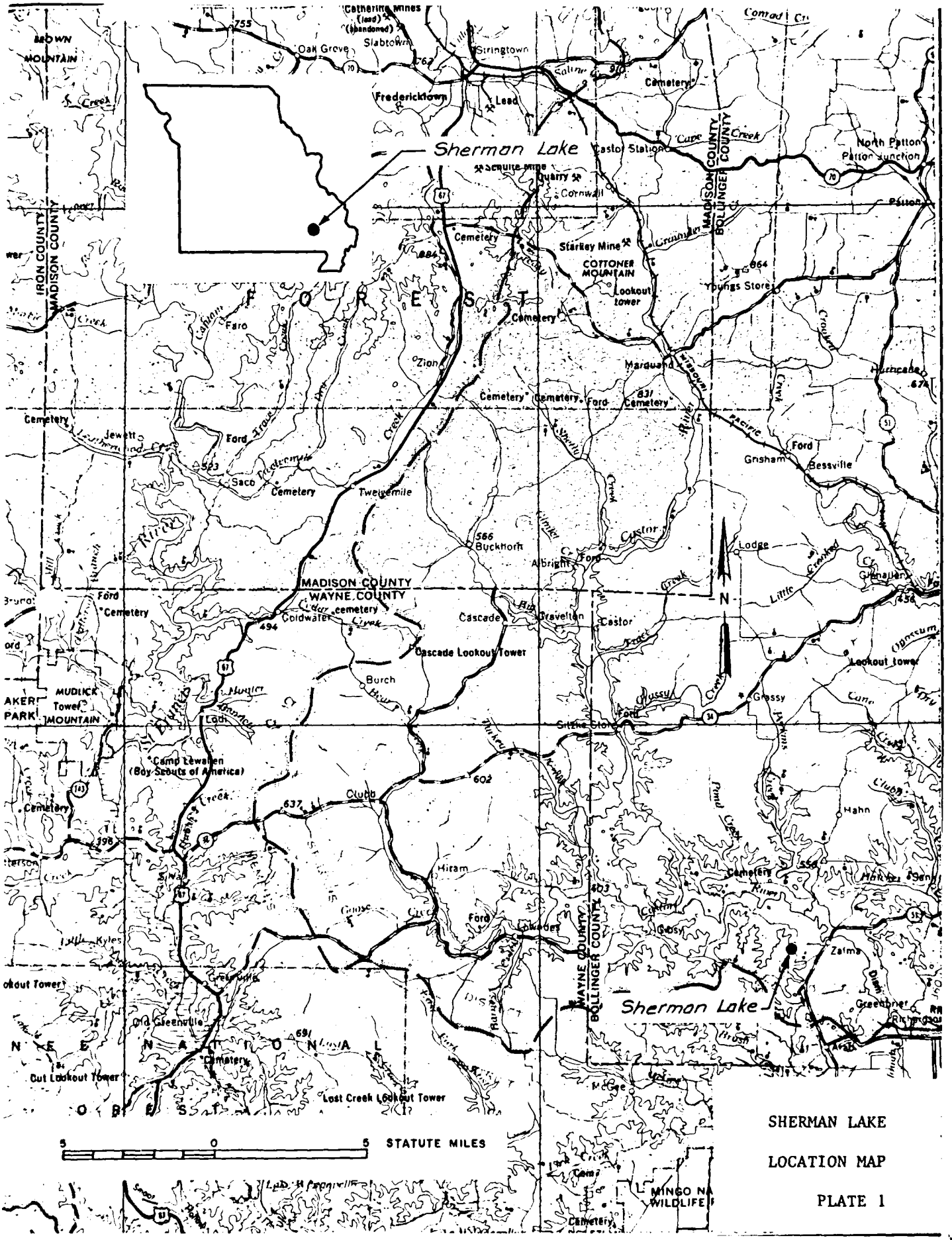
(1) Remove trees and brush on upstream embankment slope and at right abutment spillway inlet area. Care should be taken during removal not to destroy the existing conditions of the upstream embankment and spillway area.

(2) Repair wave wash and erosion areas on upstream embankment slope and provide some type of erosion protection to prevent future occurrences.

(3) Repair the downstream slope where gullies and wash areas have formed.

(4) The downstream slope and toe should be closely monitored for seepage and erosion. If seepage quantities and/or erosion observed during monitoring indicate increases or signs of material being piped from the embankment, immediate action should be taken to rectify these conditions.

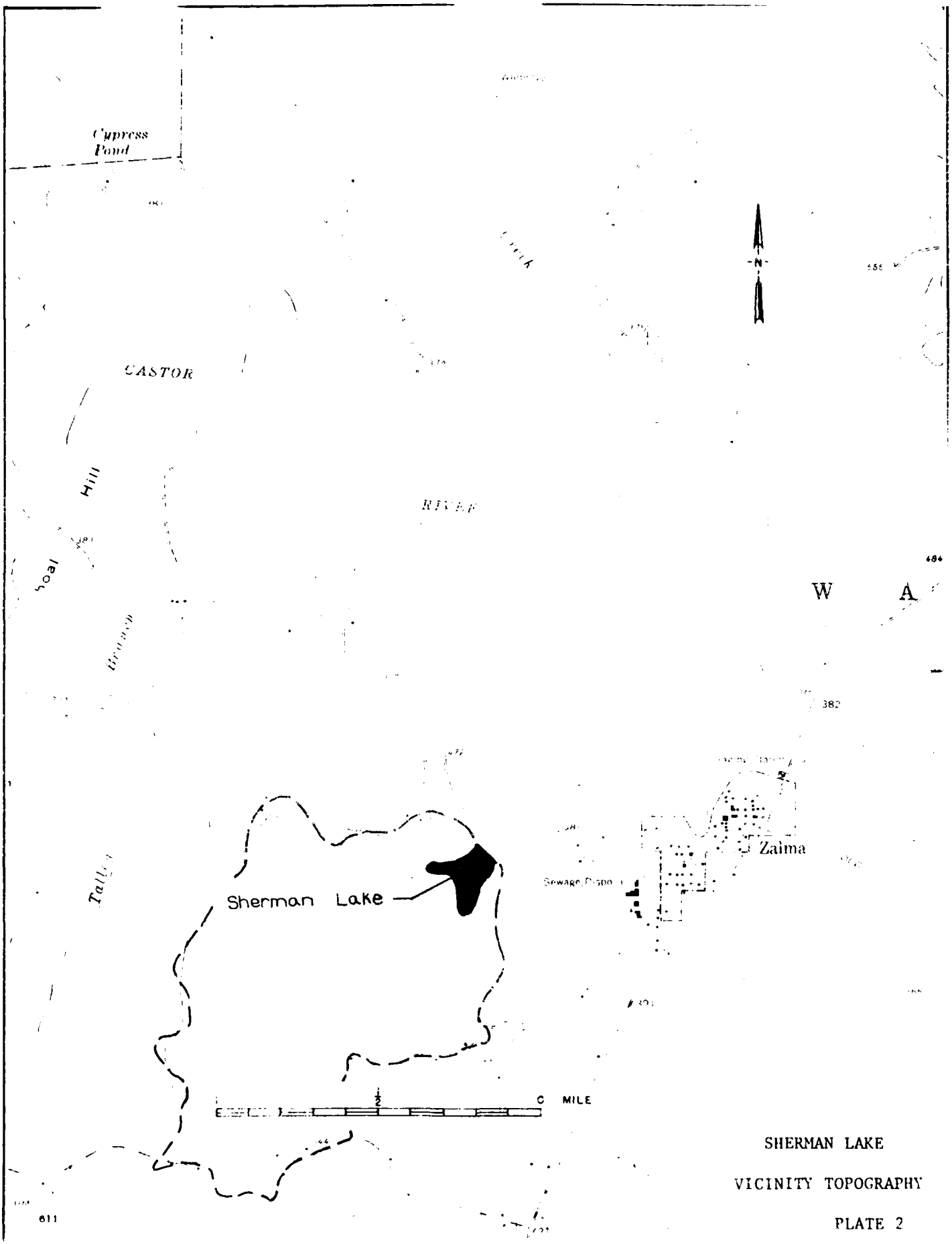
(5) A detailed inspection of the dam should be made at least every 5 years by an engineer experienced in design and construction of dams.



SHERMAN LAKE

LOCATION MAP

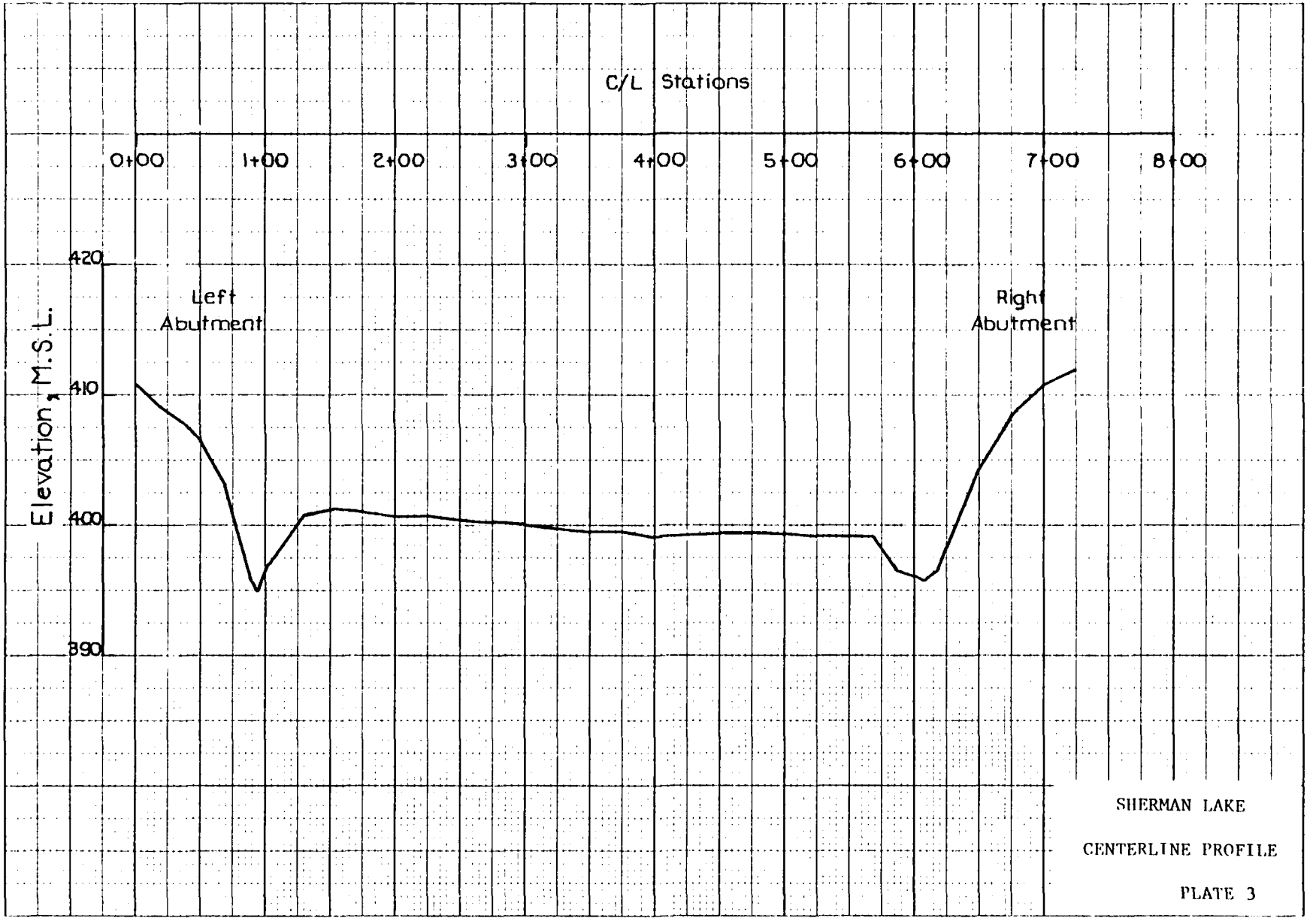
PLATE 1



SHERMAN LAKE

VICINITY TOPOGRAPHY

PLATE 2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1+00
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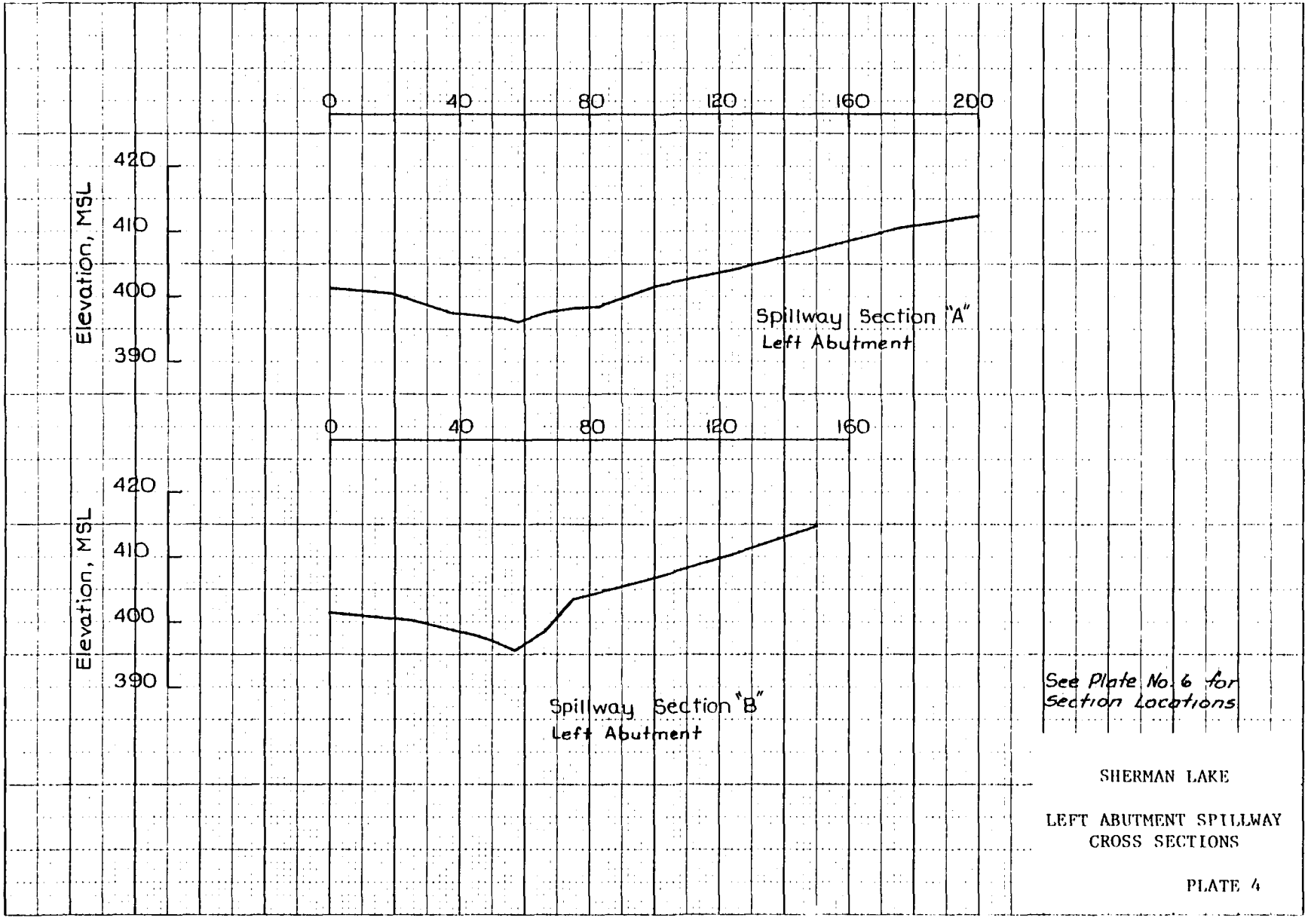
4+00
5+00
6+00
7+00
8+00
Elevation, M.S.L.
420
410
400
390
Left Abutment
Right Abutment
SHERMAN LAKE
CENTERLINE PROFILE
PLATE 3

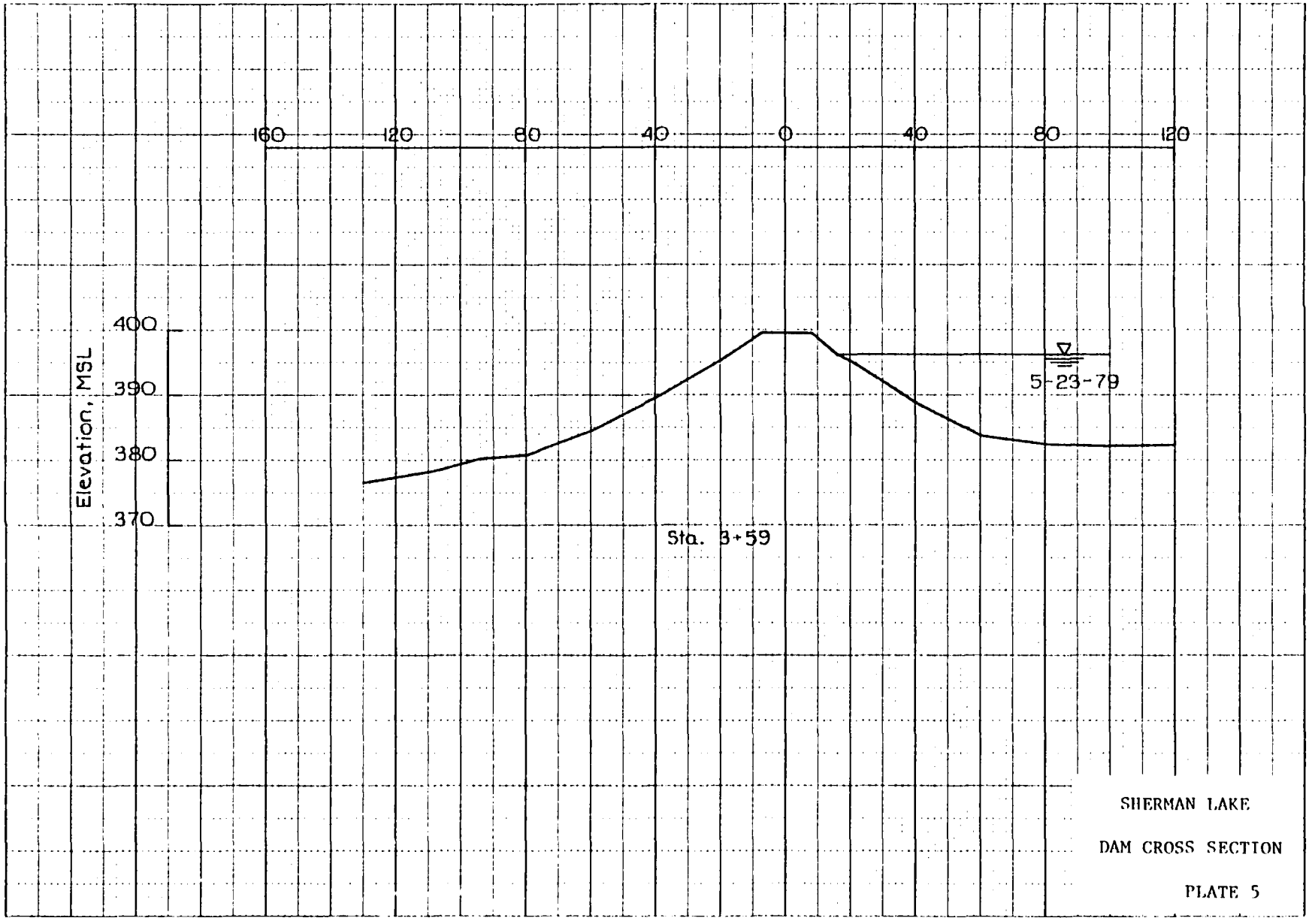


See Plate No. 6 for Section Locations

SHERMAN LAKE

LEFT ABUTMENT SPILLWAY
CROSS SECTIONS

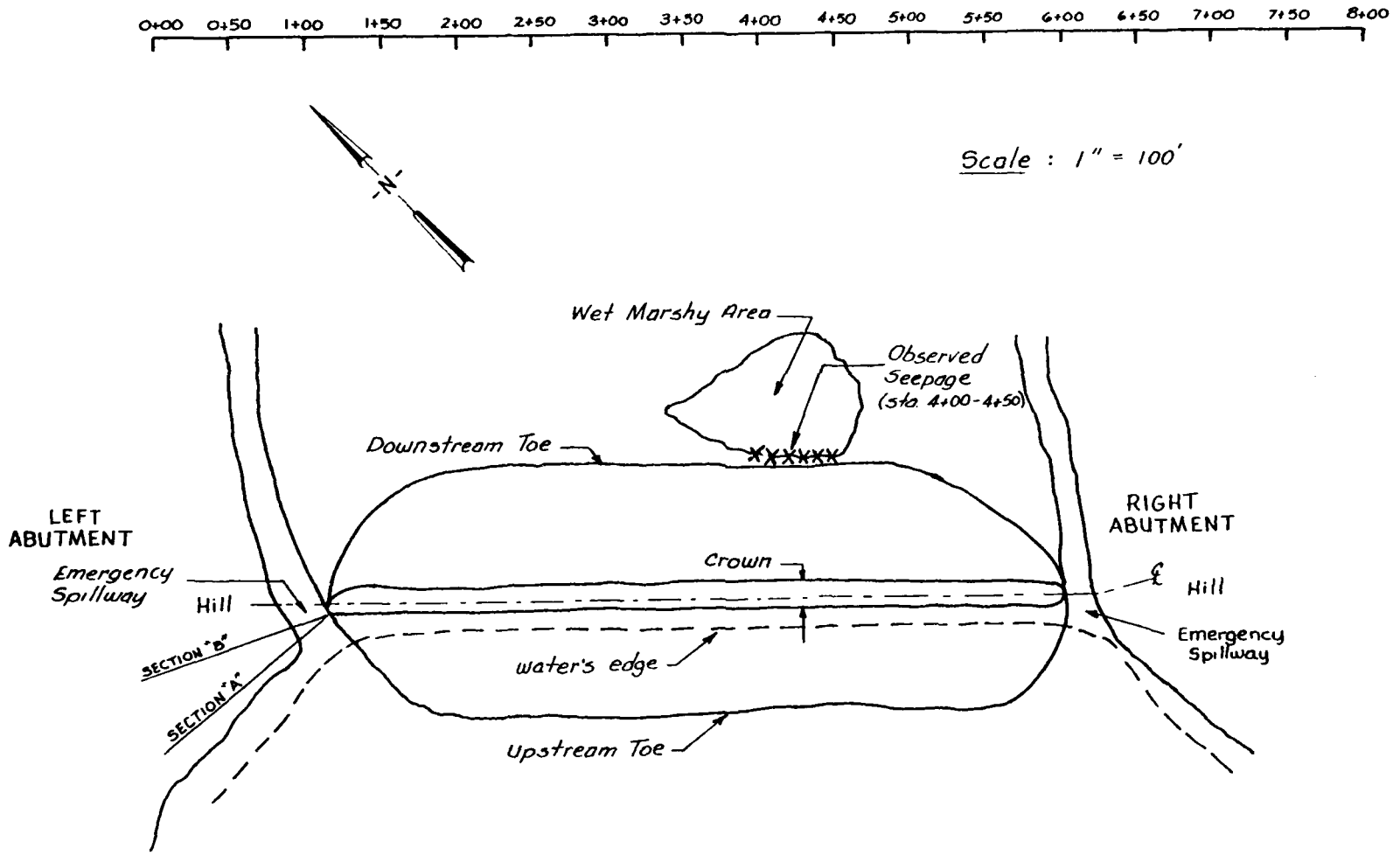
PLATE 4



SHERMAN LAKE

DAM CROSS SECTION

PLATE 5



SHERMAN LAKE
DAM PLAN VIEW
PLATE 6

APPENDIX A
HYDROLOGY AND HYDRAULIC

1. Narrative. The methods and sources of data were primarily those suggested by the Hydraulics Branch, St. Louis District, Corps of Engineers. Specific references and methods will be discussed below. A field inspection and survey was made to determine the outlet structures and the topographic characteristics of the dam. HEC-1, Dam Safety Version was used in conjunction with appropriate input parameters to compute inflow hydrographs, determine storage, and route through the structure.

a. Rainfall. The PMF was developed using Hydrometeorological Report No. 33. The "Hop Brook" reduction factor was not used to adjust the rainfall for this study. The distribution of rainfall was developed using the criteria as described by EM 1110-2-1411 (Standard Project Storm).

PMF Rainfall	27 in.	
PMF Percentages	6 hr.	102
	12 hr.	120
	24 hr.	130
	48 hr.	140

b. Unit Hydrograph Coefficients. The unit hydrograph for the drainage basin was developed using the Snyder Method as outlined in HEC-1, Dam Safety Version. Two methods of determining time of concentration were used, namely the Snyder's Method and Kirpich Method. The variable used for the appropriate method are listed below:

Snyder's:

$t_p = C_t(L\ L_{cg})^{0.3}$; L L_{cg} in miles

L = 8600 feet = 1.63 miles

L_{cg} = 4140 feet = 0.78 miles

Stream Slope = 84 ft/mile = .016 ft/ft

C_t = .6

t_p = .65 hr.

t_c = .81 hr.

Kirpich $t_c = .00013 \left(\frac{L\ ft}{\sqrt{Slope,\ ft/ft}}\right)^{.77}$

t_c = .69 hr.

Where L = length of the main stream channel from the outlet to the divide

L_{cg} = length along the main channel to a point opposite the watershed centroid

C_t = coefficient used in Snyder's Method

t_p = time to peak (hours)

t_c = time of concentration (hours)

Consequently, since the time of concentrations agreed so closely, a value for the t_p was chosen to be .67 hr. or 40 minutes which necessitated developing a 10-minute unit hydrograph and applying only a 48 hr. rainfall to develop the inflow hydrographs.

The general soils map of Bollinger County indicates that Sherman Dam lies in an area where the soil is of the Menfro-Loring-Granada Association. This places the area in a Soil Group B. The primary soil cover consists of woods in a fair hydrologic condition which gives a value of CN of 78 for antecedent moisture condition III. Consequently, a value of C_p = .647 was chosen as the runoff parameter to be used in Snyder's Method. Listed below are the remaining parameters necessary to develop the unit hydrograph of 10-minute duration.

C_p = .647
Drainage Area = .861 sq. mi.

The unit hydrograph ordinates are found in the computer printout.

b. Loss Rates. A loss rate of .5 in. initially and .05 in./hr. was chosen based upon engineering experience.

c. Base Flow and Antecedent Flood Conditions. A base flow of 1 cfs was selected and the routing was started at the low point in the right abutment spillway crest of 395.9 m.s.l.

d. Hydrograph Routing. HEC-1, Dam Safety Version uses the single routing step of the "Modified Puls" method. Routing through the emergency spillways and over the embankment was accomplished using the non-level dam top option of the HEC-1, Dam Safety Version coupled with critical energy consideration of the flow.

e. Storage. The storage was calculated with the HEC-1, Dam Safety Version with input consisting of elevations and respective surface area which were determined using the USGS Zalma quadrangle.

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**********
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
  LAST MODIFICATION  28 FEB 79
**********
    1                 A
    2                 A                                   NON-FEDERAL DAM INSPECTION
    3                 A                                        DAM #30839
    4                 A                                     SHERMAN DAM
    5                 H     300        0       10       =0       =0       =0       =0       =0       =0       =0
    6                 1       5
    7                 J       1        9        1
    8                 1      .1       .15      .18       .2       .25      .30      .35       .5       1.
    9                 K       0        1                                                    1
   10                 1                                PROBABLE MAXIMUM PRECIPITATION-8A HR DURATION
   11                 M       1        1     .8609                .8609       1.
   12                 P              27.0      102       120      130       180
   13                 T                                                                  .5      .05
   14                 W      .47      .607
   15                 X       1        1        2
   16                 K       1        2                                                    1
   17                 1                                     ROUTED FLOW THROUGH SHERMAN DAM
   18                 Y                          .                 1        1
   19                 1       1                                                    =395.9
   20                 $A      0    2,725   22,707   47,836
   21                 $F    377      380      400      420
   22                 $$  395.9
   23                 $D  399.2
   24                 $L      0       18       36       73      303      558      570      635      708
   25                 $V  395.9    396.1    396.5    399.2    399.2    401.2    403.5    408.3    411.9
   26                 W      99
```

FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION JULY 1978
LAST MODIFICATION 26 FEB 79
****

RUN DATE: 16 AUG 79
TIME: 09.30.52

NON-FEDERAL DAM INSPECTION
DAM #30839
SHERMAN DAM

JOB SPECIFICATION

NQ	NHR	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN
300	0	10	=0	=0	=0	=0	=0	=0	=0

JOPER	NWT	LROPT	TRACE
5	=0	=0	=0

MULTI-PLAN ANALYSES TO BE PERFORMED
NPLAN= 1 NRTIO= 9 LRTIO= 1

RTIOS= .10 .15 .18 .20 .25 .30 .35 .50 1.00

********** ********** ********** ********** **********

SUB-AREA RUNOFF COMPUTATION

PROBABLE MAXIMUM PRECIPITATION-6R HR DURATION

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
1	0	=0	=0	=0	=0	1	=0	=0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	.86	=0.	.86	1.00	=0.	=0	=0	=0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
=0.	27.00	102.00	120.00	130.00	100.00	=0.	=0.

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
=0	=0.	=0.	1.00	=0.	=0.	1.00	.50	.05	=0.	=0.

UNIT HYDROGRAPH DATA
TP= .87 CP= .65 NTA= =0

RECESSION DATA
STRTQ= 1.00 QRCSN= 1.00 RTIOR= 2.00
APPROXIMATE CLARK COEFFICIENTS FROM GIVEN SNYDER CP AND TP ARE TC= 8.87 AND R= 3.21 INTERVALS

UNIT HYDROGRAPH 20 END-OF-PERIOD ORDINATES, LAG= .86 HOURS, CP= .65 VOL= 1.00

52.	210.	393.	521.	531.	434.	318.	233.	170.	124.
91.	66.	48.	35.	26.	19.	14.	10.	7.	5.

END-OF-PERIOD FLOW

HO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	HO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
1.01	.10	1	.00	0.	.00	1.	1.02	1.10	151	.03	.02	.01	53.
1.01	.20	2	.00	0.	.00	1.	1.02	1.20	152	.03	.02	.01	50.
1.01	.30	3	.00	0.	.00	1.	1.02	1.30	153	.03	.02	.01	62.
1.01	.40	4	.00	0.	.00	1.	1.02	1.40	154	.03	.02	.01	65.
1.01	.50	5	.00	0.	.00	1.	1.02	1.50	155	.03	.02	.01	67.
1.01	1.00	6	.00	0.	.00	1.	[illegible]						

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS								
				RATIO 1 .10	RATIO 2 .15	RATIO 3 .18	RATIO 4 .20	RATIO 5 .25	RATIO 6 .30	RATIO 7 .35	RATIO 8 .50	RATIO 9 1.00
HYDROGRAPH AT	1	.86	1	540.	810.	972.	1080.	1350.	1619.	1889.	2699.	5398.
		(2.23)		(15.29)(	22.93)(	27.52)(	30.57)(	38.22)(	45.86)(	53.50)(	76.43)(	152.86)
ROUTED TO	2	.86	1	388.	616.	756.	877.	1214.	1516.	1793.	2635.	5392.
		(2.23)		(10.99)(	17.44)(	21.41)(	24.82)(	34.38)(	42.94)(	50.76)(	74.61)(	152.68)

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	395.00	395.00	399.20
STORAGE	148.	148.	207.
OUTFLOW	0.	0.	772.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.10	398.25	0.	187.	388.	0.	40.83	0.
.15	398.85	0.	199.	616.	0.	40.67	0.
.18	399.17	0.	206.	756.	0.	40.67	0.
.20	399.38	.18	210.	877.	.67	40.67	0.
.25	399.64	.44	217.	1214.	1.33	40.50	0.
.30	399.88	.68	221.	1516.	1.83	40.50	0.
.35	400.01	.81	225.	1793.	2.33	40.50	0.
.50	400.42	1.22	234.	2635.	4.33	40.33	0.
1.00	401.38	2.18	257.	5392.	6.17	40.33	0.

PHOTO 1: Overview of Lake and Dam

PHOTO 2: Overview of Lake

PHOTO 3: Crest of Dam

PHOTO 4: Trees on Upstream Slope

PHOTO 5: Wavewash on Upstream Slope

PHOTO 6: Erosion on Downstream Edge of Crown

PHOTO 7: Downstream Slope

PHOTO 8: Erosion on Downstream Slope

PHOTO 9: Wash Area Near Right Abutment

PHOTO 10: Saturated Area Near Downstream Toe

PHOTO 11: Saturated Area Near Downstream Toe

PHOTO 12: Seepage at Downstream Toe

PHOTO 13: Seepage at Downstream Toe

PHOTO 14: Spillway at Right Abutment - Upstream View

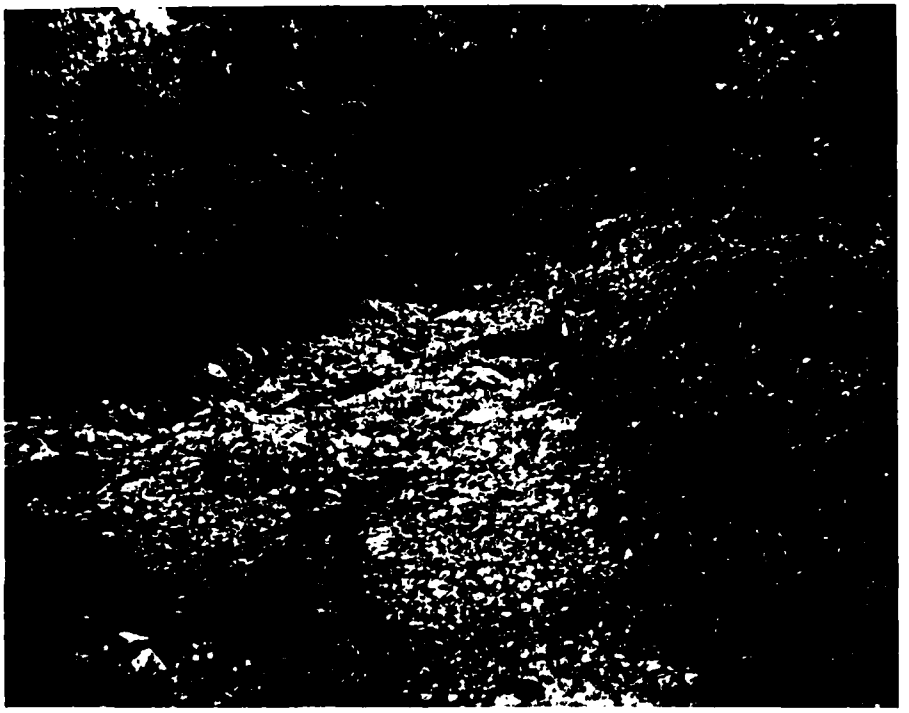

PHOTO 15: Spillway at Right Abutment - Downstream View

PHOTO 16: Spillway at Left Abutment - Side View

PHOTO 17: Spillway at Left Abutment - Downstream View

PHOTO 18: Typical Dwelling Downstream of Dam

Brookfield City Dam

Photo 1.	-	View of the upstream slope of the embankment.
Photo 2.	-	View of the crest.
Photo 3.	-	View of the downstream slope of the embankment.
Photo 4.	-	View of cracks on the crest.
Photo 5.	-	View of the riprap (dumped concrete) and the scarp above the riprap on the upstream slope.
Photo 6.	-	View of seepage (standing water) at the downstream toe of the dam.
Photo 7.	-	View of the spillway discharge channel looking downstream.
Photo 8.	-	View of the control section and the trashrack of the spillway.
Photo 9.	-	View of the discharge channel looking upstream.
Photo 10.	-	View of tilted retaining wall in the discharge channel.
Photo 11.	-	View of the energy dissipators at the end of the discharge channel.
Photo 12.	-	View of one of the pumps in the pumphouse.
Photo 13.	-	View of the downstream channel.
Photo 14.	-	View of the reservoir rim.